

REMARKS

Claims 1-12 and new claims 25-44 appear in this application for the Examiner's review and consideration. New claims 25-44 are added to more clearly define the scope of coverage sought by the present application. Claim 25 has been added to recite the photo-electrochemical reduction of a first component of an alloy-semiconductor material to form an N-type contact. Support for this claim can be found, for example, in the specification on page 8, lines 16-20. Claims 26-40, dependent from claim 25, include additional recitations that have support in the specification, for example, on page 8, lines 16-22, and page 13, lines 17-18. Claim 42 recites the photo-electrochemical removal of the first component from a first portion of the alloy-semiconductor material to form an N-type contact and removing the second component from a second portion of the alloy-semiconductor material to form a P-type contact. Support for this claim can be found, for example, in the specification on page 11, lines 22-23. Claims 43 and 44, dependent from claim 42, include additional recitations that have support in the originally filed claims and in the specification, for example, on page 8, lines 9-12, page 9, lines 6-8, and original claims 2-6. Claims 7-12 have been withdrawn from consideration with the present application as being drawn to a nonelected species. However, should a claim generic to all claimed species pursuant to 37 C.F.R. § 1.141 be allowed then the undersigned representative reserves the right to amend the claims to encompass all species as recited in the claims as originally filed. As these amendments do not introduce any new subject matter, their entry at this time is warranted.

In the Office Action mailed September 5, 2002, the Examiner imposed a restriction requirement pursuant to 35 U.S.C. § 121, alleging that the instant application presented two patentably distinct species, as follows:

1. A method for comprising photo-electrochemical removal of one component and chemical etching of a second component to form a PIN structure (claims 1-6).

2. A method comprising photo-electrochemical removal of one component and deposition of a second component to form a PIN structure (claims 7-12).

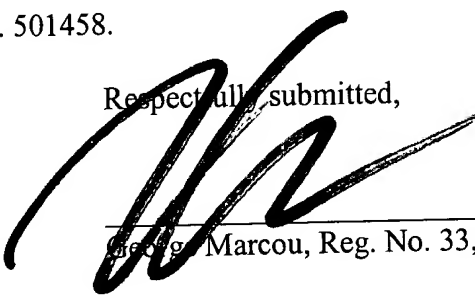
→ The undersigned representative hereby elects, without traverse, Species 1, Claims 1-6, drawn to a method comprising photo-electrochemical removal of one component and chemical etching of a second component to form a PIN structure, for examination with the present application. The election is made without prejudice to pursue the subject matter of the non-elected claims in one or more divisional or continuation applications.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

The undersigned representative submits that all of the claims are now in condition for allowance, early notification of which is respectfully requested. The total number of claims as amended is twenty six with three independent claims, and applicants have previously submitted the prescribed fee for twenty four claims in which three claims are independent claims. Therefore, a fee calculation sheet and the additional prescribed fee for the additional claims is enclosed herewith. In addition, a petition for a two month extension of time for the filing of this response is enclosed herewith along with a provision for the payment of the prescribed fee. No other fees are believed due. Should any additional fees be due, please charge such fees to Kilpatrick Stockton LLP deposit account no. 501458.

Respectfully submitted,

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Enclosure

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please add claims 25-44 as follows:

25. (NEW) A method for forming an N-type contact on an alloy-semiconductor material comprising a compound having at least a first component, the method comprising photo-electrochemical reduction of the first component to form the N-type contact.
26. (NEW) The method according to claim 25, wherein the first component comprises a Group VI element.
27. (NEW) The method according to claim 26 wherein the compound is selected from the group consisting of CdTe, CdZnTe, and HgZnCdTe.
28. (NEW) The method according to claim 25, wherein photo-electrochemical reduction of the first component comprises:
depositing a removable N-type conductive material on the alloy-semiconductor material;
connecting the deposited material to a negative terminal of a power supply;
connecting an electrode disposed in an electrolyte solution to a positive terminal of the power supply; and
exposing the electrolyte solution to a light source.
29. (NEW) The method according to claim 28, wherein the removable N-type conductive material comprises an Hg-In eutectic paste.

30. (NEW) The method according to claim 28, wherein the light source comprises a near infrared wavelength light and has a median energy equal to the band gap of the alloy-semiconductor material.

31. (NEW) The method according to claim 28, wherein the electrolyte solution comprises a pH of at least about 10.5.

32. (NEW) The method according to claim 25, further comprising forming a P-type contact on the alloy-semiconductor material.

33. (NEW) The method according to claim 32, wherein the step of forming a P-type contact comprises metal deposition.

34. (NEW) The method according to claim 33, further comprises depositing a P-type metal on the P-type contact.

35. (NEW) The method according to claim 34, wherein the step of depositing the P-type metal comprises depositing the P-type metal by vacuum deposition or electrodeless chemical exchange.

36. (NEW) The method according to claim 32, wherein the alloy-semiconductor material further comprises a second component, the second component a complimentary component of the first component, the method further comprising removing the second component to form the P-type contact.

37. (NEW) The method according to claim 36, wherein the step of removing the second component comprises chemical etching.

38. (NEW) The method according to claim 37, further comprising exposing an area of the alloy-semiconductor material comprising the P-type contact to a retarding electrochemical potential to etch the second component at a faster rate than the first component.

39. (NEW) The method according to claim 37, wherein the step of removing the second component by chemical etching comprises exposing the alloy-semiconductor material to an oxidizing agent comprising nitric acid and phosphoric acid.

40. (NEW) The method according to claim 39, wherein the nitric acid is present in an amount from about 0.1% to about 0.5% by volume.

41. (NEW) The method according to claim 39, wherein the oxidizing agent comprises a solution of HNO_3 , distilled H_2O , and H_3PO_4 , in a ratio of 2:33:85 by volume.

42. (NEW) A method for forming a rectifying junction on an alloy-semiconductor material comprising a compound comprising a first component and a second component, the method comprising:
photo-electrochemical removal of the first component from a first portion of the alloy-semiconductor material to form an N-type contact; and

removing the second component from a second portion of the alloy-semiconductor material to form a P-type contact.

43. (NEW) The method according to claim 42, wherein the step of removing the second component comprises chemical etching.

44. (NEW) The method according to claim 42, wherein the alloy-semiconductor material is selected from the group consisting of CdTe, CdZnTe, HgZnCdTe, and HgCdZnSe.